

IN THE CLAIMS

Please amend the claims as set forth below in marked-up form.

1. (Currently Amended) An image processing apparatus for converting an image of an interlacing system into an image of a progressive system, said image processing apparatus comprising:

an inter-field interpolating means for interpolating a pixel of said image of the progressive system using a pixel of a field of said image of the interlacing system to be converted and a pixel of a different field;

an intra-field interpolating means for interpolating a pixel of said image of the progressive system using pixels within the field of said image of the interlacing system to be converted;

a determining means for determining whether a pixel to be interpolated of said image of the progressive system is a moving image pixel or a still image pixel; and

a selecting means for selecting either said pixel interpolated by said intra-field interpolating means or said pixel interpolated by said inter-field interpolating means on the basis of a result of the determination by said determining means; wherein

said determining means determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel based at least in part on the absolute values of at least one of intra-field temporal differences and inter-field temporal differences.

2. (Original) An image processing apparatus as claimed in claim 1, further including an edge enhancing means for enhancing an edge of said image of the interlacing system to be converted.

3. (Original) An image processing apparatus as claimed in claim 2,
wherein said edge enhancing means subjects each of pixels of said image of the interlacing system to horizontal-direction one-dimensional filter processing and vertical-direction one-dimensional filter processing to thereby enhance the edge of said image.

4. (Original) An image processing apparatus as claimed in claim 2, further including a central pixel energy calculating means for calculating vertical-direction central pixel energy and horizontal-direction central pixel energy around each of said pixels from pixel values around said pixel,

wherein said edge enhancing means performs the filter processing on said pixel whose vertical-direction central pixel energy and horizontal-direction central pixel energy calculated by said central pixel energy calculating means exceed a predetermined value.

5. (Original) An image processing apparatus as claimed in claim 1,
wherein said inter-field interpolating means interpolates the pixel by copying the pixel of the different field onto the field of said image of the interlacing system to be converted as it is.

6. (Original) An image processing apparatus as claimed in claim 1, further including a correlation detecting means for detecting correlation between pixels at positions symmetrical with respect to a point of said pixel to be interpolated within the field of said image of the interlacing system to be converted, said pixels being on horizontal lines over and under said pixel to be interpolated,

wherein said intra-field interpolating means interpolates said pixel using a combination of pixels having the strongest correlation with each other detected by said correlation detecting means.

7. (Original) An image processing apparatus as claimed in claim 6,
wherein said correlation detecting means detects, as correlation, an absolute value of a difference between pixel values of the pixels at positions symmetrical with respect to the point of said pixel to be interpolated.

8. (Original) An image processing apparatus as claimed in claim 6, further including a proximity energy calculating means for calculating proximity energy of said pixel to be interpolated from pixel values near said pixel to be interpolated,

wherein when a value of the proximity energy of said pixel to be interpolated calculated by said proximity energy calculating means is higher than a predetermined threshold value, said

intra-field interpolating means interpolates said pixel on the basis of the pixels having the strongest correlation with each other detected by said correlation detecting means.

9. (Original) An image processing apparatus as claimed in claim 8,
wherein said proximity energy is a sum of absolute values of differences between pixel values of a predetermined number of pixels that are present on lines extending in a horizontal direction over and under said pixel to be interpolated and are opposite to each other in a direction perpendicular to said lines, or a sum of absolute values of differences between pixel values of a predetermined number of pixels that are present on said lines extending in the horizontal direction over and under said pixel to be interpolated and are present at positions symmetrical with respect to the point of said pixel to be interpolated.

10. (Currently Amended) An image processing method for an image processing apparatus, said image processing apparatus converting an image of an interlacing system into an image of a progressive system, said image processing method comprising:

an inter-field interpolating step for interpolating a pixel of said image of the progressive system using a pixel of a field of said image of the interlacing system to be converted and a pixel of a different field;

an intra-field interpolating step for interpolating a pixel of said image of the progressive system using pixels within the field of said image of the interlacing system to be converted;

a determining step for determining whether a pixel to be interpolated of said image of the progressive system is a moving image pixel or a still image pixel; and

a selecting step for selecting either said pixel interpolated by processing of said intra-field interpolating step or said pixel interpolated by processing of said inter-field interpolating step on the basis of a result of the determination by processing of said determining step; wherein

said determining step determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel based at least in part on the absolute values of at least one of intra-field temporal differences and inter-field temporal differences.

11. (Currently Amended) A program for execution by a computer for controlling an image processing apparatus, said image processing apparatus converting an image of an interlacing system into an image of a progressive system, said program comprising:

an inter-field interpolation control step for controlling interpolation of a pixel of said image of the progressive system using a pixel of a field of said image of the interlacing system to be converted and a pixel of a different field;

an intra-field interpolation control step for controlling interpolation of a pixel of said image of the progressive system using pixels within the field of said image of the interlacing system to be converted;

a determination control step for controlling determination of whether a pixel to be interpolated of said image of the progressive system is a moving image pixel or a still image pixel; and

a selection control step for controlling selection of either said pixel interpolated by processing of said intra-field interpolation control step or said pixel interpolated by processing of said inter-field interpolation control step on the basis of a result of the determination by processing of said determination control step; wherein

said determination control step determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel based at least in part on the absolute values of at least one of intra-field temporal differences and inter-field temporal differences.

12. (Currently Amended) A recording medium for recording a computer readable program for controlling an image processing apparatus, said image processing apparatus converting an image of an interlacing system into an image of a progressive system, said program comprising:

an inter-field interpolation control step for controlling interpolation of a pixel of said image of the progressive system using a pixel of a field of said image of the interlacing system to be converted and a pixel of a different field;

an intra-field interpolation control step for controlling interpolation of a pixel of said image of the progressive system using pixels within the field of said image of the interlacing system to be converted;

a determination control step for controlling determination of whether a pixel to be interpolated of said image of the progressive system is a moving image pixel or a still image pixel; and

a selection control step for controlling selection of either said pixel interpolated by processing of said intra-field interpolation control step or said pixel interpolated by processing of

said inter-field interpolation control step on the basis of a result of the determination by processing of said determination control step; wherein

said determination control step determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel based at least in part on the absolute values of at least one of intra-field temporal differences and inter-field temporal differences.

13. (New) An image processing apparatus as claimed in claim 1, wherein said determining means determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel in at least one of the following circumstances:

when a maximum value of absolute values of the intra-field temporal differences is higher than 1/3 of a maximum value of absolute values of the inter-field temporal differences;

when one of the absolute values of two inter-field temporal differences is higher than a predetermined minimum threshold value and higher than ½ of the other absolute value, and the result of multiplying the two inter-field temporal differences is negative and the absolute value of the result of adding the two inter-field temporal differences is lower than a predetermined threshold value; and

when one of the absolute values of the two inter-field temporal differences is higher than a predetermined maximum threshold value and higher than ¼ of the other absolute value, and the result of multiplying the two inter-field temporal differences is negative and the absolute value of the result of adding the two inter-field temporal differences is lower than the predetermined threshold value.

14. (New) An image processing apparatus as claimed in claim 4, wherein said determining means determines that said pixel to be interpolated of said image of the progressive system is a moving image pixel in at least one of the following circumstances:

when a maximum value of absolute values of the intra-field temporal differences is higher than 1/3 of a maximum value of absolute values of the inter-field temporal differences;

when one of the absolute values of two inter-field temporal differences is higher than a predetermined minimum threshold value and higher than ½ of the other absolute value, and the result of multiplying the two inter-field temporal differences is negative and the absolute value of the result of adding the two inter-field temporal differences is lower than a predetermined threshold value; and

when one of the absolute values of the two inter-field temporal differences is higher than a predetermined maximum threshold value and higher than $\frac{1}{4}$ of the other absolute value, and the result of multiplying the two inter-field temporal differences is negative and the absolute value of the result of adding the two inter-field temporal differences is lower than the predetermined threshold value.